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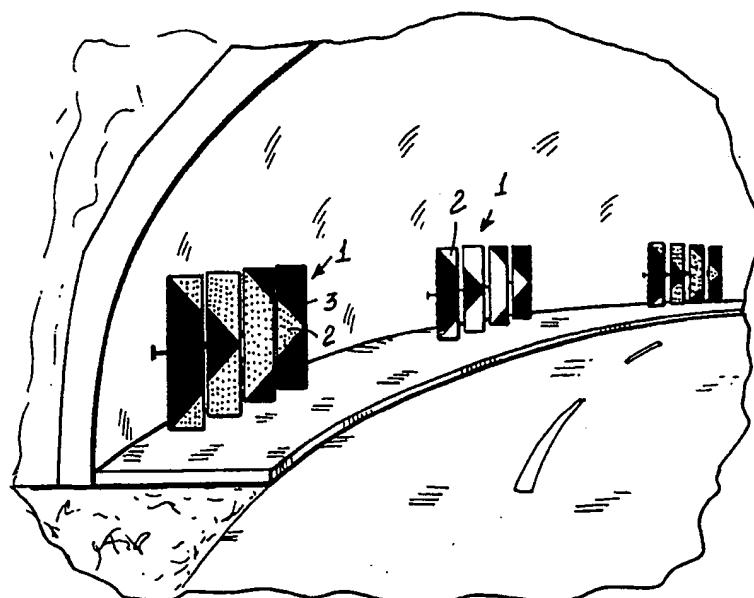
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⑲ Road signalling device, for facilitating access to tunnels.

⑳ The roadside signalling device, specifically for tunnel entrances comprises a panel (1) provided with illuminated fibre optic signalling elements (2), preferably having high directional characteristics,

and which may be arranged to define a traffic sign or part thereof. In a bend a plurality of panels (1) may be placed in a staggered array so as together to display an illuminated directional arrow.



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ROAD SIGNALLING DEVICE, FOR FACILITATING ACCESS TO TUNNELS

BACKGROUND OF THE INVENTION

The present invention relates to a road signalling device, which has been particularly designed for facilitating access to tunnels and the like.

As is known, a very important problem is that of properly lighting the access regions to tunnels, mainly in highways and in very high outer light condition, such as, for example, in full-sun days.

Known solutions to the above mentioned problems, have been found to be not completely satisfactory, since they are mainly based on the concept of decreasing the light difference between the outside and inside environment by arranging, at the access region of a tunnel, a lighting system provided for assuring a comparatively high lighting level.

This lighting system, on the other hand, is very expensive, both due to the installation cost and to the maintenance and operating costs, since such a system consumes a very great amount of electric power.

This problem is further aggravated as a tunnel starts with a road bend in which case a car driver can hardly detect the bend direction and, mainly at a high speed of the car, the driver can drive for several tens of meters in a "blind" way.

For solving the above mentioned problems, special paints have also been used, which, however, have provided unsatisfactory results.

SUMMARY OF THE INVENTION

Accordingly, the aim of the present invention is to overcome the above mentioned drawbacks, by providing a road signalling device which has been specifically designed for facilitating access to road tunnels, and which affords the possibility of nearly immediately detecting the road edges by means of a visual information.

Within the scope of the above mentioned aim, a main object of the present invention is to provide such a road signalling device which, while providing a sufficient light amount, does not generate any dazzling phenomena to a car driver and allows for the driver to clearly detect the road profile.

Another object of the present invention is to provide such a signalling device which is very reliable in operation, and can be easily made starting from easily available materials and elements and which, moreover, is very competitive from a mere economic standpoint.

According to one aspect of the present invention, the above mentioned aim and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by a signalling device, which has been specifically designed for facilitating access to road tunnels, having the features indicated in the characterizing portion of the main claim.

BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the road signalling device according to the invention will become more apparent from the following detailed disclosure of a preferred embodiment thereof, which is illustrated, by way of an indicative but not limitative example, in the figures of the accompanying drawings, where:

Figure 1 is a schematic view showing the road signalling device according to the present invention;

Figure 2 is another schematic plan view showing a tunnel with a bend access, therein there are arranged, on the bend extrados several road signalling devices according to the invention;

Figure 3 is a perspective view corresponding to figure 2;

Figures 4 and 5 show a tunnel right access portion;

Figures 6, 7 and 12 show several road signalling devices according to possible embodiments of the invention;

Figures 8 and 11 show signalling devices for signalling a road bend, which has been constructed by mutually coupling several signalling panels; and

Figures 9 and 10 show signalling devices for use in association with a rectilinear-edge road.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

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With reference to the figures of the accompanying drawings, the road signalling device, specifically designed for facilitating access to road tunnels, according to the invention, comprises a panel body, indicated overall at the reference number 1, which can have any suitable shapes, provided that they are in accordance with the inflexible road code

On at least a surface portion of the mentioned

panel 1 there are arranged respective end portions of a plurality of optic fibres, overall indicated at 2, so arranged as to provide a traffic sign or indication.

According to a preferred embodiment of the invention, the signal emitted from the mentioned optic fibres can be clearly detected at a great distance, but it is not visible as the view angle is greater than 12°, so as to suppress any possible dazzling phenomena.

Advantageously, the bottom of the mentioned panel 1 is made by using a refracting film 3, so as to provide a great visual efficiency.

In fact, optic fibre signalling devices or panels have a very high brightness, and they can be clearly detected from the outside of the tunnel in due time; this fact is very important since provides the driver with an immediate indication of the road path.

In this connection it should be apparent that the light signs to be applied must be in accordance with the in-force road code.

As schematically shown in figures 1, 3, 8 and 11, the subject signalling device can be constructed by mutually coupling to one another a plurality of panels which can be arranged either in an adjoining or in an offset configuration so as to provide a single indication as they are seen at a given distance.

It should be also apparent that the provision of a light refracting film bottom will provide a very efficient light signal.

A control or adjusting system can be also associated with the device of the invention for adjusting the optic fibre brightness depending on the environment light.

From the above disclosure it should be apparent that the invention fully achieves the intended aim and objects.

While the invention has been disclosed and illustrated with reference to the preferred embodiments thereof, it should be apparent that the disclosed embodiments are susceptible to several modifications and variations all of which come within the spirit and scope of the appended claims.

are so arranged as to emit a respective light signal having highly direction characteristics, the light signals of said optic fibres being invisible as the visual angle is greater than 12°.

- 5 3. A road signalling device, according to claims 1, 2, characterized in that said road signalling device comprises a plurality of adjoining panel bodies.
- 10 4. A road signalling device, according to one or more of the preceding claims, characterized in that said device comprises a plurality of panel bodies spaced and offset from one another adapted to provide, at a distance, a single light signal.
- 15 5. A road signalling device, according to one or more of the preceding claims, characterized in that said panel body comprises a light refracting bottom devoid of optic fibres
- 20 6. A road signalling device according to one or more of the preceding claims, characterized in that said device comprises a light adjusting unit adapted to adjust the brightness of the light signals emitted by said optic fibres depending on the environment light.

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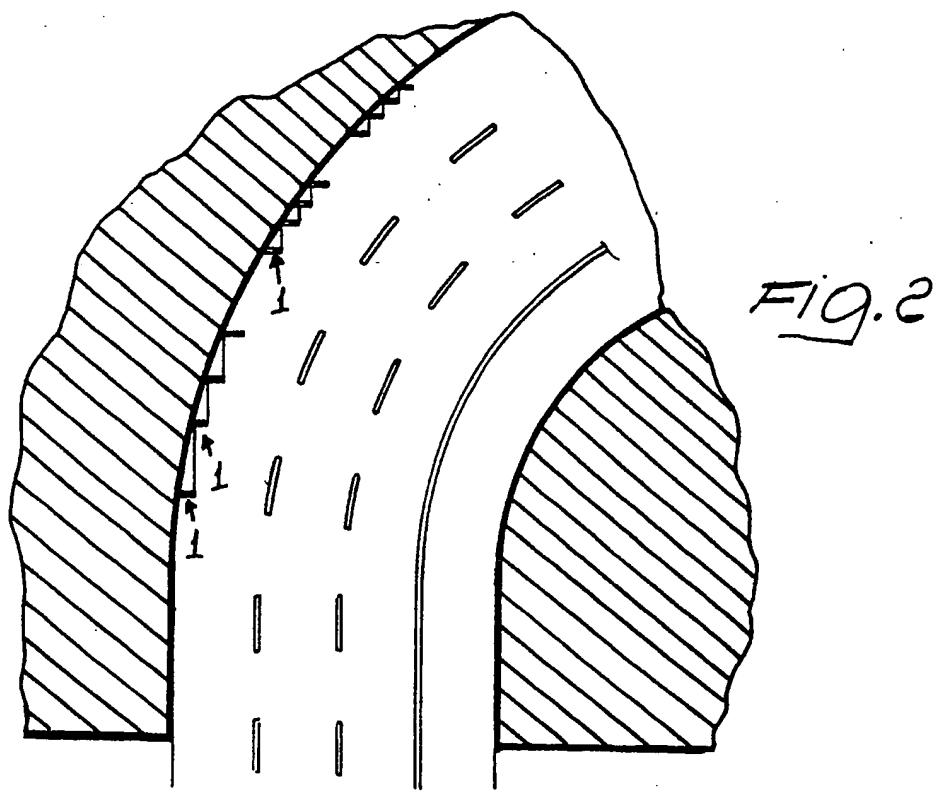
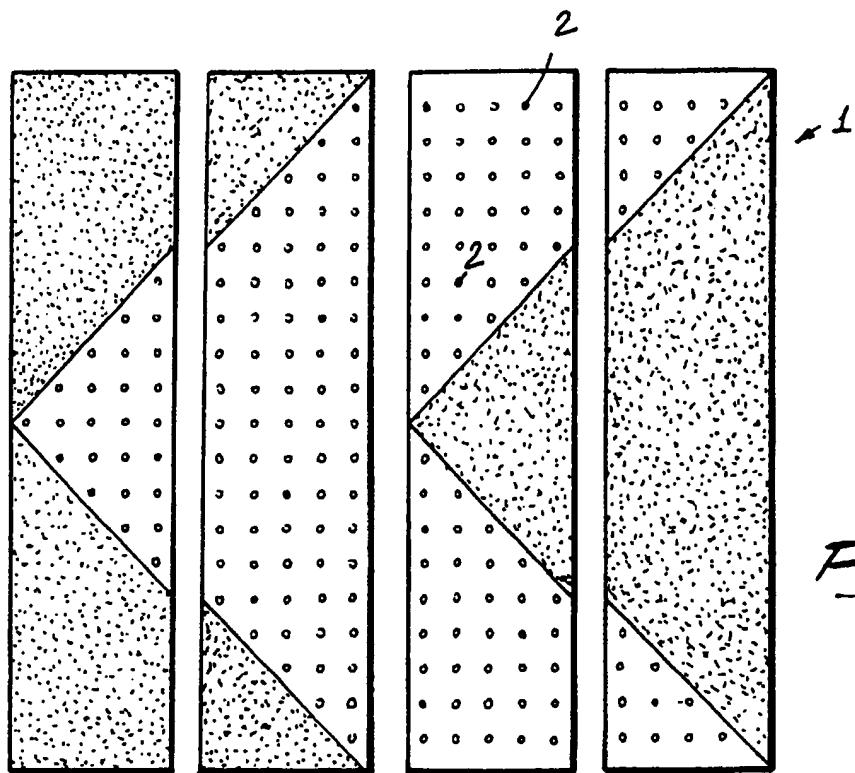
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Claims

1. A road signalling device, specifically designed for facilitating access to tunnels, characterized in that said road signalling device comprises a panel body including optic fibre signalling members, so designed and arranged as to define a road indication or sign in accordance with the in-force road code.
2. A road signalling device according to claim 1, characterized in that the optic fibre of said device

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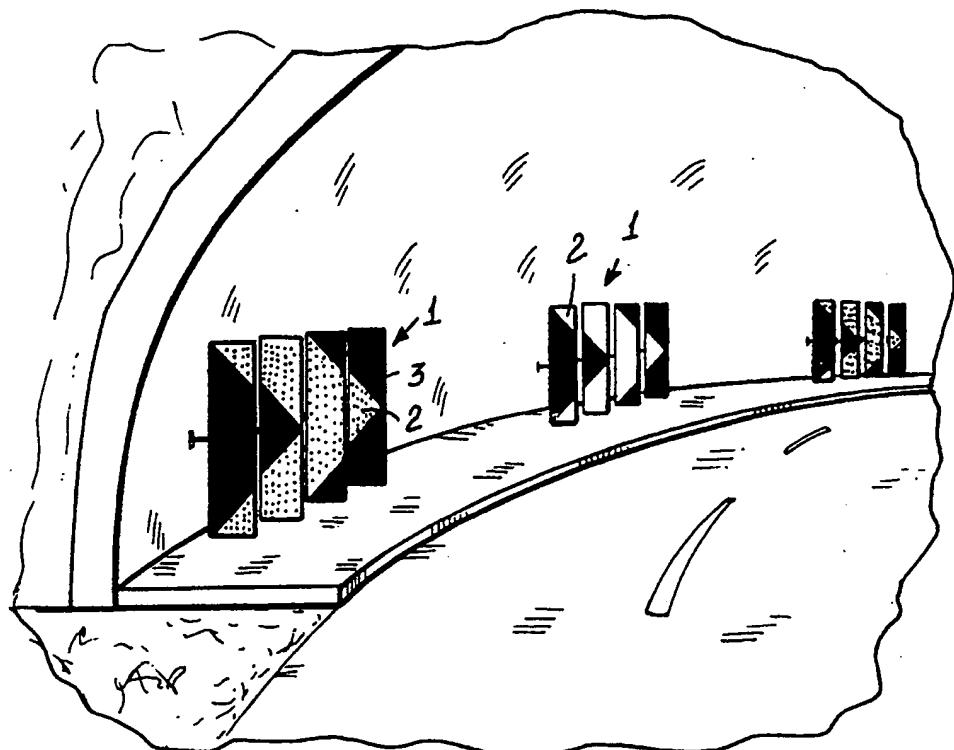


FIG. 3

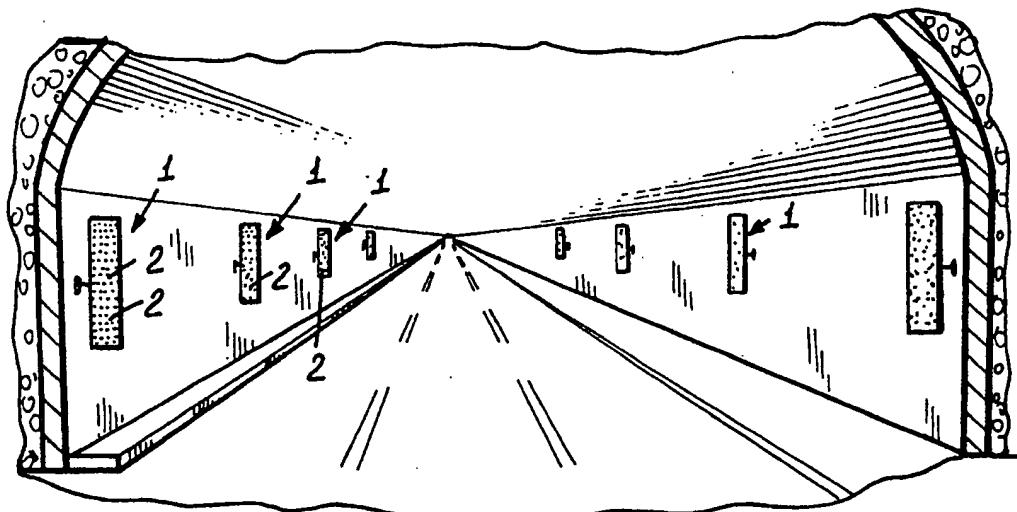


FIG. 4

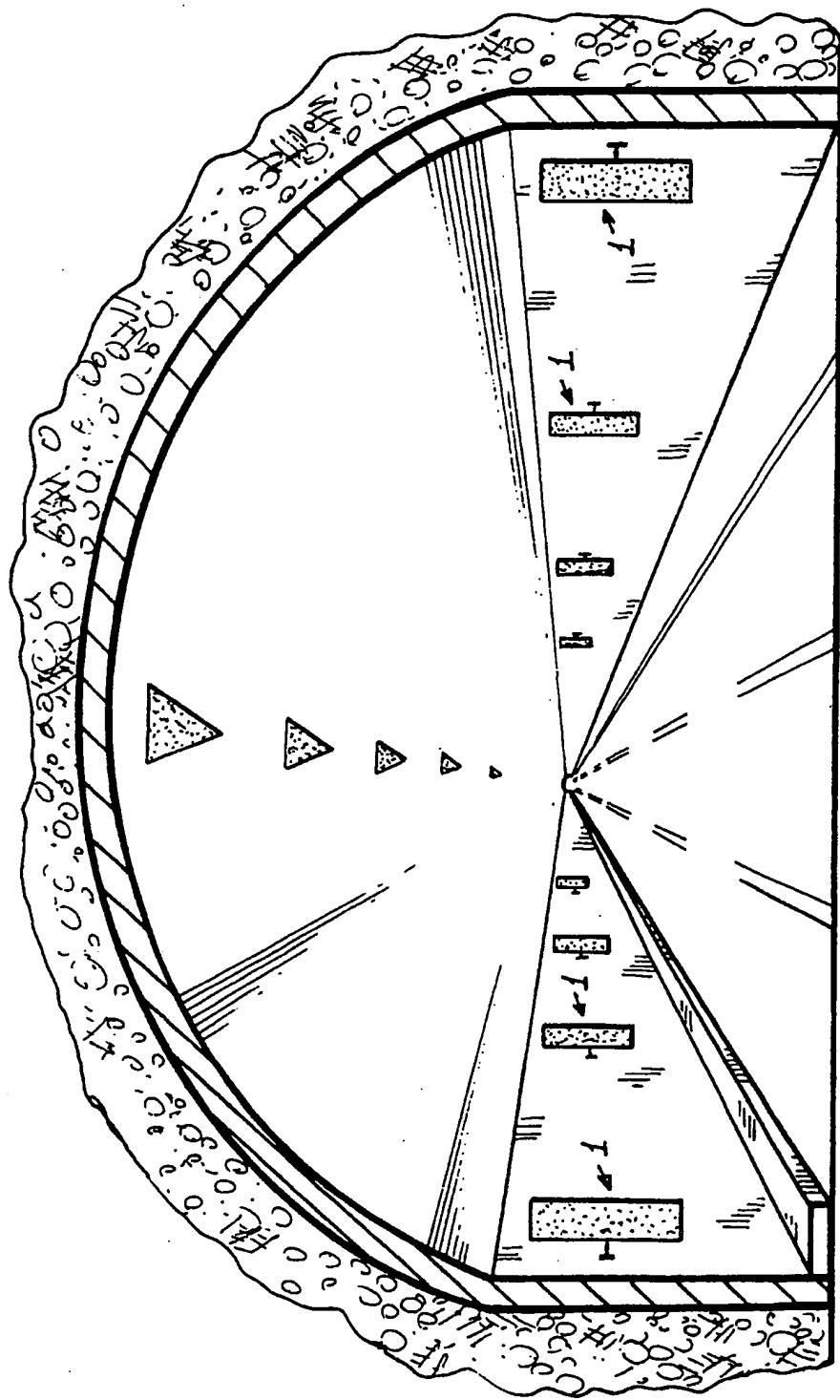


FIG. 5

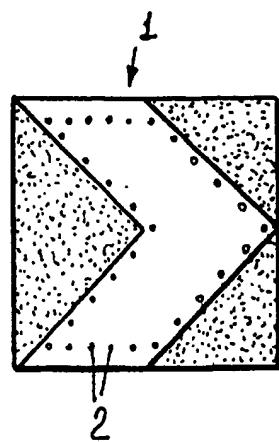


FIG. 6

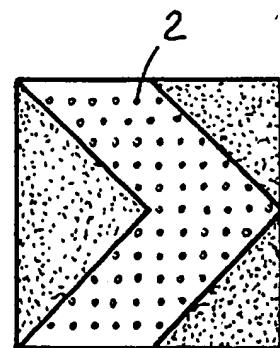


FIG. 7

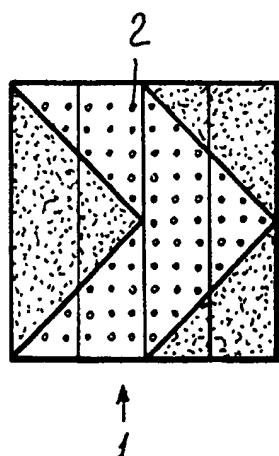


FIG. 8

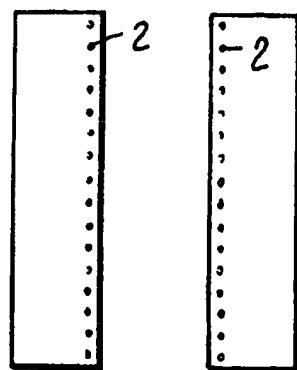


FIG. 9

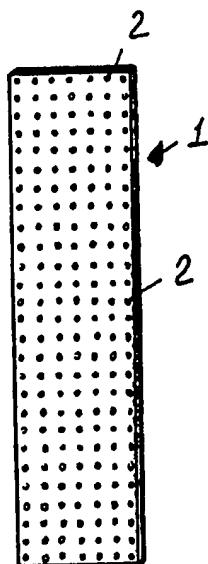


Fig. 10

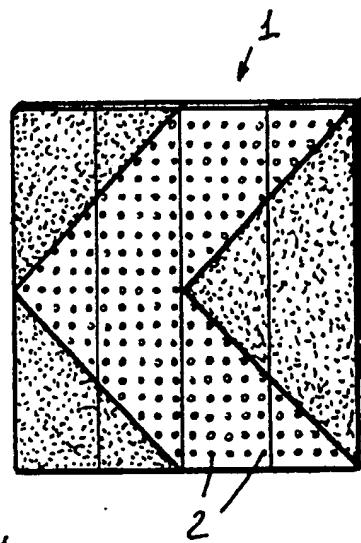


Fig. 11

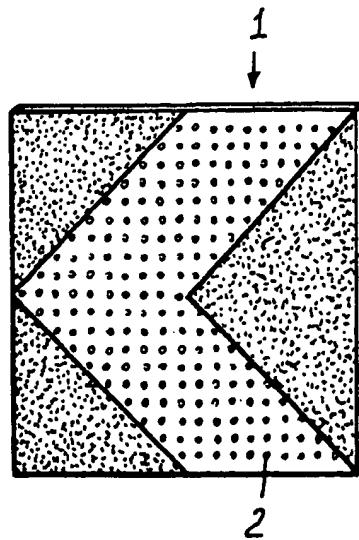


Fig. 12



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EUROPEAN SEARCH REPORT

Application Number

EP 89 83 0365

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	FR-A-2 501 884 (JEAN NEUHAUS SA) * Page 1, lines 3-16; page 2, lines 10-24, 30-34; page 3, lines 12-22; page 5, lines 18,19; page 6, lines 9-16, 32-37; page 7, lines 1,2,17,18,24-27; figures 1-3 *	1,2	G 09 F 13/00 E 01 F 9/10 E 21 D 9/14 F 21 V 8/00 G 09 F 19/22
Y	---	4	
A	AT-B- 373 361 (FILL) * Page 2, lines 1-4,42-48; page 3, lines 16-18,22-26; figures 1b,3-8 *	3	
A	ROUTE ET TRAFIC, vol. 67, no. 3, March 1981, pages 66-69, Zürich, CH; H.P. LINDENMANN: "Verbesserung der optischen Führung nachts in Kurven durch betriebliche und bauliche Massnahmen" * Page 68, figure 4; page 69, figure 7 *	1	
A	US-A-3 750 099 (PROCTOR) * Column 2, lines 24-29; column 6, lines 13-15,34-39; column 7, lines 20-27,34,35,40-42,54-58; figures 3,8-10 *	1	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	WO-A-8 704 230 (THE SECRETARY OF STATE FOR TRANSPORT IN HER BRITANIC MAJESTY'S GOVERNMENT) * Page 1, lines 2-4; page 2, lines 3-8; page 3, lines 12-21; page 5, lines 15,16,19,20,24-27 *	1	G 09 F E 01 F E 21 D
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The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	07-05-1990	SCHUMAN R.	
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone	T : theory or principle underlying the invention		
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DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. 5)									
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim										
A	WO-A-8 807 560 (THE SECRETARY OF STATE FOR TRANSPORT IN HER BRITANNIC MAJESTY'S GOVERNMENT) * Page 1, lines 23-38; page 2, lines 3,4,17-21,30-32,34-36; page 3, lines 24-28; page 4, lines 5,6; figure 2 * ---	1										
A	GB-A-2 076 042 (REDLAND AUTOMATION) * Page 1, lines 44-51,113-119; page 2, lines 13-17; page 3, lines 13-18; figure 3 * ---	1										
A	GB-A-2 157 470 (SMITH) * Page 1, lines 5-7,23-27,32-43,45,46,82-86,88-95; page 2, lines 31-37,43-48,69-73; figure 1 * ---	1										
Y	GB-A-2 128 664 (SHO-BOND CONSTRUCTION et al.) * Page 1, lines 3-6,80-87,93,94,96-99,106-111; page 2, lines 7-11,20-22; figures 1-3,7,8 * ---	3										
A	---	1										
Y	GB-A-2 183 698 (GLASDON) * Page 1, lines 5-12,15-20,96-99; page 2, lines 20-28; figure 1 * ---	3										
Y	FR-A- 738 484 (JUDLIN) * Page 1, lines 1-17,50-53,55-62; page 2, lines 20-22,26-36,42-44; figures 1-3 * ---	4										
		-/-										
<p>The present search report has been drawn up for all claims</p> <table border="1"> <tr> <td>Place of search THE HAGUE</td> <td>Date of completion of the search 07-05-1990</td> <td>Examiner SCHUMAN R.</td> </tr> <tr> <td colspan="2">CATEGORY OF CITED DOCUMENTS</td> <td>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons A : member of the same patent family, corresponding document</td> </tr> <tr> <td colspan="2">X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</td> <td></td> </tr> </table>				Place of search THE HAGUE	Date of completion of the search 07-05-1990	Examiner SCHUMAN R.	CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons A : member of the same patent family, corresponding document	X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	FR-A- 911 490 (BLONDEL) * Page 1, lines 1-4, 19, 20, 25, 26, 36-38; page 2, lines 18-22, 38-47, 57-59, 74-76; figures 3, 4, 6 *	4	
A	FR-A-2 466 819 (PARIENTE) * Page 1, lines 1-7, 14-32; page 2, lines 22-24; page 3, lines 7-14, 16-24, 29-35; page 4, lines 7-14, 18-25; page 5, lines 23-26, 29-32; figures 1-3 *	1, 2, 5	
A	US-A-2 642 788 (ANDREWS) ----		
A	US-A-4 249 832 (SCHMANSKI) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
<p>The present search report has been drawn up for all claims</p>			
Place of search EPO FORM 1500.02.02 (PCP01)	Date of completion of the search 07-05-1990	Examiner SCHUMAN R.	
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